§ 2.1513 Measurements of modulation characteristics.

(a) *Set-up.* Test of modulation characteristics are to be performed in an RF shielded room.

Step (1) Place the EPIRB directly on a metal ground plane, such as the shielded room floor.

Step (2) Place a suitable receiving antenna at a convenient distance from the EPIRB and connect it to the input of the spectrum analyzer or receiver to observe the radiated signal from the EPIRB.

Step (3) Set the spectrum analyzer or receiver controls as follows:

I.F. bandwidth: 300 kHz minimum
Video filter: OFF or as wide as possible
Amplitude scale: Linear
Frequency: 121.5 MHz
Scan width: 0 Hz

Step (4) Connect the detected output of the spectrum analyzer or receiver to the input of the storage oscilloscope.

Step (5) Set the oscilloscope controls as necessary to allow the demodulated waveform to be viewed. The input signal is to be DC coupled.

(b) *Measurement of Audio Frequencies.*

Step (1) Activate the EPIRB.

Step (2) Trigger the oscilloscope and store at least one complete cycle of the audio waveform.

Step (3) Measure the period (T) of the waveform. The period is the time difference between the half voltage points at the beginning and end of one complete cycle of the waveform. See Figure 2.

Step (4) Calculate the frequency (F), where:

$F=1/T$.

Step (5) Repeat Steps 2 through 4 until the highest and lowest audio frequencies are found.

NOTE: The lowest and highest frequencies may occur several cycles before or after the transition from low to high frequency.)

Step (6) Determine the audio frequency range (F_{range}), where:

$F_{range}=F_{high}-F_{low}$

Step (7) Record instrument settings and the lowest and highest audio frequencies. Record the audio frequency range in Hertz.

Step (8) Repeat Steps 1–7, above, for 243 MHz.

(c) *Modulation factor.*

Step (1) Activate the EPIRB.

Step (2) Trigger the oscilloscope and store at least one complete cycle of the audio waveform. The input signal is to be DC coupled or erroneous results will be obtained.

Step (3) Measure the maximum voltage (V_{max}), and the minimum voltage (V_{min}) for the cycle. The modulation factor (M) is calculated from the following formula:

$$M=\frac{V_{max}-V_{min}}{V_{max}+V_{min}}$$

See Figure 2.

Step (4) Repeat Steps 2 and 3 until the lowest modulation factor is found.

Step (5) Record instrument settings and the lowest modulation factor, expressed as a ratio between 0 and 1.

Step (6) Repeat the above measurements for 243 MHz.

(d) *Modulation duty cycle.*

Step (1) Activate the EPIRB.

Step (2) Trigger the oscilloscope and store at least one complete cycle of the audio waveform.

Step (3) Measure the period (T) of the waveform. The period is the time difference between the half voltage points at the beginning and end of one cycle of the waveform. See Figure 2.

Step (4) Measure the pulse width (t_p) of the waveform. The pulse width is the time difference between the half voltage points on the rising and falling portions of the waveform. See Figure 2.

Step (5) Calculate the duty cycle (D) as follows:

$$D=\frac{t_p}{T}$$

Step (6) Repeat Steps 2 through 5 a sufficient number of times to determine the highest and lowest duty cycles.

Step (7) Record instrument settings and the highest and lowest duty cycles in percent.

Step (8) Repeat Steps 1–7 for 243 MHz.

(e) *Sweep repetition rate.*

Step (1) Connect a speaker to the detected output of the spectrum analyzer or receiver so the audio frequencies are audible. Alternatively, an FM radio tuned to 108 MHz placed in the vicinity of the EPIRB may be used.

Step (2) Activate the EPIRB.

Step (3) Time the number of audio sweeps (N) for a one minute interval.

Step (4) Calculate the audio sweep rate (R) using $R=N/60$.

Step (5) Record instrument settings and the sweep repetition rate in Hertz.

§ 2.1515 Spectral measurements.

(a) *Set-up.* Spectral measurements are to be performed in a shielded room.